

# Saturday



# Magazine.

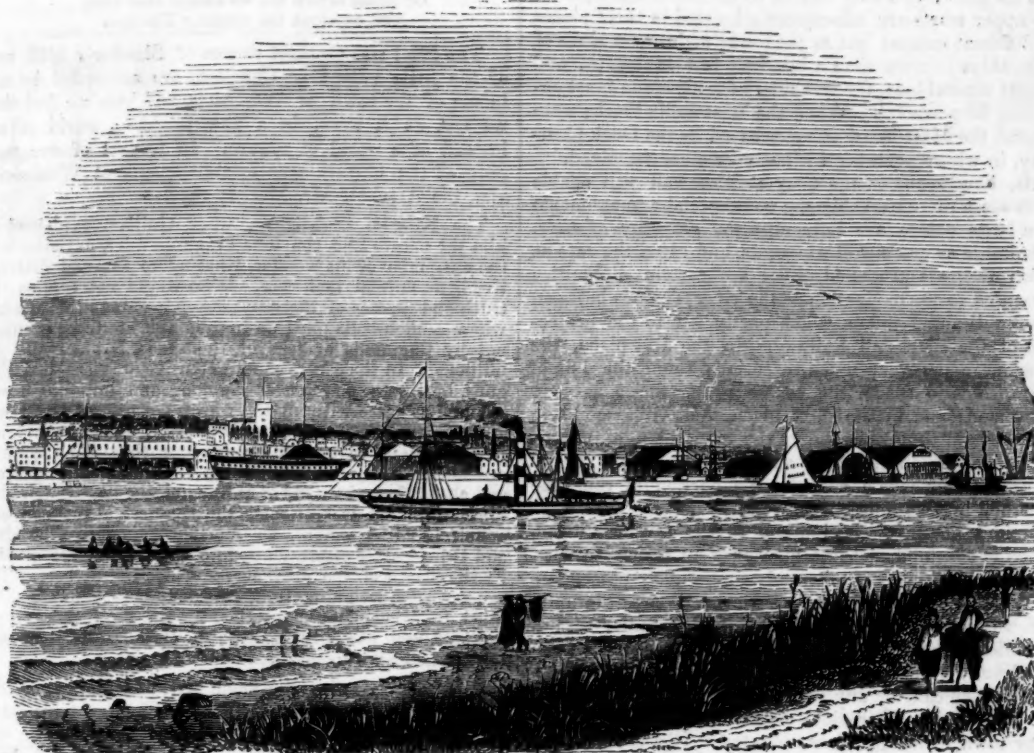
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OCTOBER

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## THE BANKS OF THE THAMES.



THE DOCKYARD AT WOOLWICH.

### BLACKWALL—SHOOTER'S HILL—WOOLWICH— PURFLEET.

How great is the difference between the appearance which the Thames presents now, when viewed from Greenwich, and that which it presented twenty years ago! Then, as now, the countless sails, belonging to merchant vessels of all grades, indicated the vast traffic carried on; but we have now the steam-boat traffic in addition thereto. Perhaps there is not now a single moment in the day, from eight o'clock in the morning till dusk, when one or more steamers may not be seen pursuing its swift course either on the western margin of the Isle of Dogs, from Limehouse to Greenwich, or on the eastern margin, from Blackwall to Greenwich. We see exhibited a most extraordinary medley of names—Harlequins and Columbines, Witches, Naiads, Fairies, Nymphs, Diamonds, Rubies, and Pearls, Stars, Satellites, and Vespers, Royal Georges, Royal Williams, Royal Adelaides, in short the ingenuity of steam-boat proprietors seems to have been taxed to the utmost, to find out new and striking appellations for their vessels; and the enormous living burdens which these vessels sometimes carry, sufficiently indicate the favour in which steam-boat travelling is now held.

The changes above alluded to are nowhere more conspicuous than at *Blackwall*, especially when taken in conjunction with the introduction of Railway traffic. Whoever was acquainted with Blackwall ten years ago,

knew it as a kind of maritime suburb of the metropolis, where a few ship-builders lived, and also a few maritime men; they knew it as a spot which derived its chief importance from the position which it held with respect to the East and West India Docks; the former bounding it on the east, and the latter on the west. Or perchance they might, as many a wealthy Londoner has done, have gone there to partake of a feast of "white-bait." But now the whole external appearance of the place has changed. If we stand at the gates of the East India Docks and look westward, or at the Brunswick stairs and look eastward, or on the opposite shore of Kent and look northward, we find Blackwall a very much more bustling place than it has ever before been. Let us see in what manner these changes of external appearance have been wrought. Until the recent changes, the premises of a large ship-builder joined those of the East India Dock Company; and both together occupied the greater part of the river frontage at this spot. But the London and Blackwall Railway has been carried in an extraordinary manner, over and under and between and around various parts of these properties, and is brought within a few yards of the river, with a fine quay or wharf between the river and the railway terminus. A handsome and commodious building contains the requisite offices for the railway passengers; while the quay is becoming every year more and more extensively used by steam-boat passengers, who

can step on board the steam vessels with a facility and safety nowhere exceeded.

Few persons have passed down the river in this direction, without remarking a tall, square, clumsy, dark-coloured building, now nearly contiguous to the railway chimney, but formerly isolated. This is known as the *Mast-house*, and has been so known for half a century. It was built by Mr. Perry, a shipwright, as a means of fitting the masts into large ships more conveniently than can be done by any other method. The ship is brought up to the side of the building; the mast is elevated by tackle till it is raised above the hull, and is then lowered into its place; this only relates to the lower masts, since the upper masts are subsequently hoisted to their places by different means; but as the lower main-mast alone of some ships is more than a hundred feet in length, and weighs several tons, the machinery for elevation must obviously be powerful. When the East India Docks were formed, the Mast-house was purchased by the Dock Company, in whose possession it has ever since remained.

An hour spent on the quay at Blackwall will enable us to see how remarkably the commercial arrangements of a large nation are influenced by *economy of time*. Admirable as are our steam-boats, and rapid the rate at which they are propelled, there are certain difficulties presented to the navigation of the river Thames between Blackwall and London, which partly led to the projection of the Blackwall Railway. In the first place, the river meanders very much, especially round the Isle of Dogs, so as to render the course nearly thrice as long as by land; and in the next place, the vast assemblage of vessels in the Pool renders the navigation of vessels a point of much difficulty and some danger. Many travellers now save a considerable portion of the time absorbed in this long route, by disembarking at Blackwall, and pursuing the journey to the city by railway, which is accomplished in a quarter of an hour. In what manner this facility is taken advantage of by passengers to Woolwich, to Gravesend, to Herne Bay, to Margate, &c., we need not explain; all classes are familiar with it.

Following the course of the river eastward from Blackwall, we come to the *River Lea*, the most eastern point which can, by any stretch of application, be called the metropolis. It divides Middlesex from Essex, the busy town from the silent country. It was spoken of by Spenser as "The wanton Lea, that oft doth lose his way," and by Pope as "The gulfy Lea, with sedgy tresses." It is the most famous fishing stream in the neighbourhood of London, flowing through or near many towns and villages familiar to the votaries of Izaak Walton—such as Hertford, Ware, Amwell, Hoddesden, Broxbourne, Cheshunt, Waltham Abbey, Enfield, Edmonton, Tottenham, Walthamstow, and Bow. Beyond or below the last-mentioned village, the Lea is lost amongst ship-yards, manufactories, gas-works, tar-works, and other establishments much more useful than fragrant; after which it emerges into the Thames at the spot known as Bow Creek.

The objects skirting the southern bank of the river next demand attention. Here we descry the lofty eminence of Shooter's Hill, once designed as the site of a town, but now chiefly distinguished by the principal building called Severndroog Castle. The purport of the building is sufficiently expressed by the inscription on a tablet over the gate, which runs as follows:—

This building was erected in the year 1784, by the representative of the late Sir William James, Bart., to commemorate that gallant officer's achievements in the East Indies, during his command of the Company's maritime forces in those seas; and in a particular manner to record the conquest of the Castle of Severndroog on the Coast of Malabar, which fell to his superior valour and able conduct, on the 2nd day of April, 1755.

It was in reference to the pleasant vicinity of this hill that Bloomfield wrote the following lines:—

To hide me from the public eye,  
To keep the throne of reason clear,  
Amidst fresh air to breathe or die,  
I took my staff and wander'd here,  
Suppressing every sigh that heaves,  
And coveting no wealth but thee,  
I nestle in the honey'd leaves,  
And hug my stolen liberty.  
O'er eastern uplands, gay or rude,  
Along to Erith's ivy'd spire,  
I start, with strength and hope renew'd  
And cherish life's rekindling fire;  
Now measure vales with streaming eyes,  
Now trace the churchyard's humble names,  
Or climb brown heaths abrupt that rise,  
And overlook the winding Thames.

The quiet and pleasant scenes of Shooter's Hill, and of the little village of Charlton, are succeeded by the bustle of the town of Woolwich, and here we feel that we are, as it were, in a new world—a world of art instead of a world of nature. In respect of one part only of the Government establishments at Woolwich; viz., the Arsenal, Mr. Mackay says,—

The King of Brobdingnag, when Gulliver explained to him the nature and the uses of gunpowder, exclaimed in the extremity of his wonder, what a ferocious and destructive little animal man was. Who would not confess the truth and justice of the satire, after a visit to this arsenal, where cannon-balls piled up in pyramids are to be counted, not by thousands or tens of thousands, but actually by millions! In the centre of an extensive area are arranged guns, howitzers, and mortars, in long and imposing rows. Though at peace with all the world, we are ready for war at a minute's notice; and at Woolwich alone are laid up, fit for use, no less than twenty-four thousand pieces or ordnance, twenty-one thousand of them made of cast iron, and about three thousand of gun-metal, the largest weighing ninety hundred weight, and the smallest about two and a half hundred weight, forming altogether two hundred and two separate assortments, into which they are divided by the length of the piece or the width of the bore. The cannon-balls, weighing from two pounds to thirty-six, are piled in tremendous pyramids, to the number of three millions, each one only awaiting the impulse to fly through the air, laden with death and destruction.

We may say with the same writer, "Long may the cannon grace the Arsenal, and its millions of balls stand in trim pyramids, to surprise the beholder! The day that should call them from their repose would be a disastrous one for Europe, and for humanity."

To describe a tithe of the Government establishments at Woolwich is wholly beyond our present purpose. The Arsenal, with its subdivisions into the foundry, the laboratory, the store-house, the carriage department, the engineer's department, the proofing department; the Common, with its artillery barracks, its military hospital, its military repository, and its military academy; and the Dock-yard, with its various establishments for building and fitting-out a ship—form collectively a large and interesting subject, which we contemplate entering upon in separate articles at some future time. We will therefore here merely remark that Woolwich, independent of its government establishments, scarcely presents any claim to our notice.

The Essex coast opposite Woolwich, and from thence to Purfleet, is singularly devoid of interest; it is flat and marshy, and seldom attracts the eye of a traveller from the opposite coast, except in reference to the corn-fields at a distance from the river. The shore is so low that great mischief was done by an inundation at a spot called Dagenham, in the last century. The mischief was occasioned by the disruption of a small sluice, or trunk, made for the drain of the land-waters on the banks, and was at its beginning not more than sixteen feet broad; but for want of proper attention, the constant force and fall of the water in a few years increased to so great a depth as to extend in several branches above a mile and a half into the country. It was computed that more



than a hundred and twenty acres of marsh ground were washed into the Thames by the inundation. After many unsuccessful projects carried on at an enormous expense by the land-owners, to stop the breach, application was made to Parliament; and an Act was passed empowering the Government to pay twenty-five thousand pounds to a Captain John Perry, for repairing the breach. He effected the arduous undertaking in five years; but received ultimately forty thousand pounds—although even then he is said to have reaped nothing but honour by the enterprise.

Beyond Dagenham marshes, the elevated land of *Purfleet* comes into view. It is situated at the mouth of a rivulet which empties itself into the Thames; and is chiefly inhabited by persons employed in the extensive lime-works and chalk-pits in the vicinity. Within and among the cliffs vast caverns have been excavated, which present many picturesque walks; and on their summit during the alarm of the Spanish invasion, the standard of England was placed by Queen Elizabeth, together with a beacon corresponding with other signal fires around the coast. *Purfleet* is perhaps principally remarkable at the present day for the powder magazines established there. Up to the year 1718, large quantities of gunpowder were stored at Greenwich; but in that year the inhabitants, dreading the awful results of an explosion in such a busy place, petitioned the king to remove the magazine to a more desolate spot. From various causes, forty years were suffered to elapse before anything was done in the matter; and it was not till 1762 that the present *Purfleet* magazine was completed. The magazine consists of five parallel buildings, each 160 feet long by 52 wide. The walls are 5 feet thick, and there is an arched roof beneath the slates 3 feet thick. No iron enters into the composition of the buildings, even the hinges of the doors being made of copper and brass. The powder is kept in small barrels, which are piled up within wooden frames, the numbers stored having been, on some occasions, so large as thirty thousand, containing three million pounds of gunpowder.

The pretty little village of *Erith* will be the point at which we shall re-commence our route in the next Article.

## OLD ENGLISH NAVIGATORS.

### STEVENS AND LANCASTER. I.

WHILE Cabot was pursuing the honourable career which arose out of his discoveries in America; and Willoughby, Charcellor, and Burroughs, were suffering in the piercing regions of the Lapland seas; and Frobisher and his companions were exploring new regions in Baffin's Bay, as detailed in previous articles; the Portuguese were pursuing the important and lucrative traffic consequent on the discovery of a route to India by way of the Cape of Good Hope. As the honour of discovering this route does not belong to an Englishman, we cannot include the discoverer in our present list; but we may trace our countrymen along that path at a later date.

Bartholomew Diaz, towards the close of the fifteenth century, succeeded in coasting along the western side of Africa to its southernmost point; where he encountered tempests which led him to denominate the limit of his voyage the "Cape of Storms." The King of Portugal, however, whose mind was bent on discovering the maritime route to India, changed the name to the Cape *Buona Speranza*, or Cape of Good Hope, as being more expressive of his feelings on the matter. Shortly afterwards, Vasco de Gama succeeded in "doubling" or passing round this formidable cape, and in reaching India thence across the Arabian Sea. Hence ensued a system of communication, kept up between Portugal and India, throughout the whole of the sixteenth century, a system productive of much wealth and influence to

Portugal. It is not clearly known who were the first Englishmen who made this voyage; but the first who have left any distinct description of the route were STEVENS and LANCASTER, whom we will now follow.

Thomas Stevens appears to have been—not a commander of a vessel—but only a passenger to India in a foreign ship in the year 1579; we shall, therefore, only notice his account for the curious opinions occasionally expressed in it. On passing the Gulf of Guinea, the traveller experienced "many inconveniences of heates, and lacke of windes, that they thinke themselves happy when they have passed it; for sometimes the ship standeth there almost by the space of many dayes, sometime she goeth, but in such order that it were almost as good to stand still; and the greatest part of this coast not cleare, but thicke and cloudy, full of thunder and lightning, and raine so unwholesome, that if the water stand a little while, all is full of wormes, and falling on the meat which is hanged up, it maketh it straight full of wormes."

The ship was thirty days in passing from the sixth degree of N. lat. to the Equator, partly on account of contrary winds, and partly from calms. Stevens complains bitterly of these calms, which he says were "very troublesome to those ships which be the greatest of all other, and cannot go without good windes."

The ship appears to have proceeded due southward from the Cape de Verd Islands, and then to have turned eastward to the Cape of Good Hope. The remarks of Stevens, as to the mode in which mariners were at that time accustomed to guess their longitude, are full of instruction, as showing the invaluable contributions which modern astronomy has made to navigation in this respect. "You know that it is hard to sail from east to west, or contrary, because there is no fixed point in all the skie, whereby they may direct their course, wherefore I shall tell you what helps God provided for these men. There is not a fowle that appeareth, or a signe in the aire, or in the sea, which they have not written which have made the voyages heretofore. Wherefore, partly by their owne experience and pondering withall what space the ship was able to make with such a winde and such direction, and partly by the experience of others whose books and navigations they have, they gesse whereabouts they be, touching degrees of longitude, for of latitude they be alwayes sure; but the greatest and best industry of all is to marke the variation of the needle or compass." From this it is plain that the mariners of those days made use of a great variety of tests in determining their longitude, all exceedingly rude, but forming an aggregate which the bold and hardy adventurers were willing to confide in.

When they arrived within about a hundred miles of the Cape of Good Hope, a flight of nearly three thousand sea-fowls hovered round and followed the ship; a welcome sign to the mariners, as it indicated an approach towards land. Having rounded the cape, the ship proceeded onward towards Gôa, then the principal settlement of the Portuguese in the East Indies. Stevens tells us that there were two ways of proceeding from the Cape to Goa; one between the mainland and the Isle of St. Lawrence, (Madagascar?) by which the crews were enabled to rest for a fortnight at Mosambique; and the other directly across the Arabian Sea, outside the island. So slow was the voyage in those days, and imperfect the preventives from scurvy, that the crew in Stevens' ship suffered severely from this dreadful disease while making this passage from the Cape to Goa; no fewer than a hundred and fifty men being sick at one time. When they had been for many weeks out on this sea, longing for land, (for their provisions were nearly exhausted,) they were overjoyed to see some birds which they supposed belonged to India, and which thus indicated that the land of destination was near; but they afterwards found that the land in the vicinity was that of the island

of Socotra, at the mouth of the Red Sea. Fortunately, however, a wind sprang up which carried them safe to the western coast of India; although Stevens speaks with much apprehension of certain currents and winds which modern science has demonstrated and accounted for as the "equinoctial currents" and the "trade winds."

JAMES LANCASTER, the next navigator to whom we shall invite attention, comes more within the scope of our present object than the last; for he was put into command of a vessel bound—not only to the East Indies, but to regions beyond; at a time when Englishmen had scarcely directed their energies to that quarter. Three large vessels left Plymouth on the 10th of April, 1591, for the purpose of making a voyage to the eastern seas; of these, two were commanded by Captains Haymond and Kendal, but ulterior circumstances led to the separation of them from the vessel commanded by Lancaster, and we shall therefore have chiefly to trace the career of the latter.

The three ships proceeded in company from Plymouth towards the equinoctial line, where they encountered winds so totally adverse as to drive them towards the coast of America near Brazil, three thousand miles out of their proper course. But a favourable wind happening to spring up afterwards, they succeeded in reaching the Cape of Good Hope, where they anchored in a safe harbour a few leagues northward of the extreme promontory. The Cape was not then, as now, a populous place where vessels could be supplied with water and provisions, and the crew receive a temporary respite from the dangers of the ocean. It was a bleak and barren spot inhabited by none but rude natives, who could with difficulty be brought to barter provisions with ship's crews. In the case of Lancaster and his companions, they tried in vain, for fifteen or twenty days, to induce the natives to come and trade with them; and were obliged to land on an uninhabited island near the harbour, to procure a stock of penguins and seals. Fortunately, however, a few native Africans came cautiously down to the shore shortly afterwards, and were made to understand, by means of signs, that the crew wanted oxen and sheep, for which they would give equivalent value. Twenty-four oxen and as many sheep were purchased, at a price which Lancaster terms "dog-cheape," viz., two knives for an ox, and one knife for a stirk or a sheep. The account given of the antelopes, of the sheep "who have no wooll on their backs but haire," of the deer, &c., accord pretty nearly with what is known of the African animals at the present day.

When the captains of the three ships came to examine the number and health of their crews, it was deemed proper that one ship should return to England, leaving to the other two the greater number of able hands. Not many days afterwards the two ships rounded the Cape of Good Hope, and were immediately visited by such a storm as separated them; and Lancaster never afterwards heard of his companions. Lancaster, in the "tall shippe" *Edward Bonaventure*, proceeded onward, and was attacked off the island of Comora, with a violent storm of lightning. He says (or rather Hakluyt narrates, writing from the oral dictation of Lieutenant Barker who served under Lancaster):—

We had a terrible clap of thunder which slew foure of our men outright, their necks being wrong in sunder without speaking any word; and of ninety-four men there was not one untouched, whereof some were stricken blind, others were bruised in their legs and armes, and others in their breasts, so that they voided blood two dayes after: others were drawn out at length as though they had been racked. But (God be thanked) they all recovered saving onely the foure which were slaine outright. Also with the same thunder our maine maste was torne very grievously from the head to the decke, and some of the spikes that were ten inches into the timber were melted with the extreme heate thereof.

After narrowly escaping some shoals near the island

of Madagascar, and missing the port of Mozambique, they anchored off the African coast near the entrance to the Red Sea, and endeavoured to traffic with the Moors; who were described as being of tawny colour and good stature, but very treacherous and "diligently to be taken heed of." Sixteen of the crew, who were sent on shore for water and provisions, shortly afterwards returned with the king of the adjacent country. He was dressed in an outer garment of crimson satin, and was treated very courteously by Lancaster; but this courtesy did not prevent the crew from experiencing the perfidious character of the Moors; for thirty-two of the seamen, who had gone on shore in two boats for a farther supply of water, were slain within sight of the remaining seamen; the latter being unable to render assistance to their unfortunate comrades, for want of a third boat.

Captain Lancaster and his remaining crew set sail with heavy hearts, and proceeded to Zanguibar, (Zanzibar,) where they remained from November, 1591, to February in the following year; employing the intervening time in making themselves a boat. The narrative at this part gives us a curious insight into the jealousy with which the Portuguese regarded the visits of any other Europeans in the eastern seas; a jealousy which too closely accords with the usages of nations generally, for us to disbelieve. The Portuguese had a factory or establishment at Zanguibar, from which a boat was despatched to gain intelligence of the number and object of the new comers. The answer was received with a kind of surly silence; but Captain Lancaster afterwards found that the Portuguese had been in the habit, in their intercourse with the native Africans, of representing the English as Cannibals, and as people whom they ought, for their own interests, to avoid as much as possible. The Portuguese governor of the settlements along the coast even attempted forcibly to seize the boat belonging to the ship, and would have succeeded had not the English been apprised of their danger by some of the Moors, who seem to have found the dreaded "man-eaters," much more trustworthy persons than they had supposed.

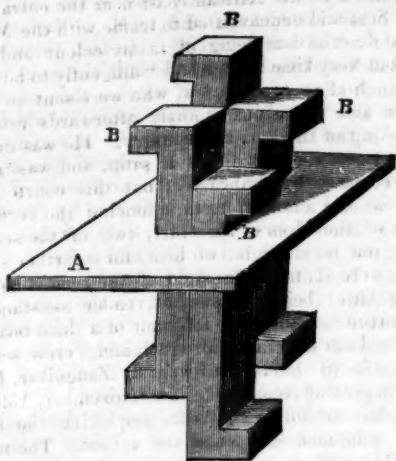
Lancaster found on the African coast a good store of wood fit for ship repairs; and also procured several thousand pounds weight of pitch, or rather a kind of grey and white gum, similar to frankincense, rather brittle in itself, but capable of being brought into a fit state for use by mixture with oil. Having availed himself of all the advantages which the coast afforded, and foiled another hostile attack from the Portuguese authorities, he set sail in an eastern direction towards the southern promontory of the Peninsula of India. Lancaster's plan seems to have been, to lie in wait for any of the Portuguese and Spanish ships which might be returning from the eastern islands with valuable freights, (for such was a part of English policy at that time,) but he was so perplexed by the winds and currents which had previously excited the surprise of Stevens, that he was driven northward far out of his regular course. He therefore considered the propriety of anchoring near the Red Sea, and delaying his voyage; but a wind suddenly sprang up which was just in the direction to carry them to Cape Comorin, the south point of India. They took advantage of the wind, and arrived at that point in the month of May, 1592.

Here we will leave them for the present.

THE great aim of a Christian woman will always be so to make others happy, that their feelings shall be attuned to the reception of better thoughts than those which relate to mere personal enjoyment,—so to make others happy, as to win them over to a full perception of the loveliness of those Christian virtues which her own life and conduct consistently set forth.—ELLS.



## MECHANICAL PUZZLES. I.



It is often curious to observe the different modes in which different persons attempt the solution of a mechanical puzzle. The extent of their acquaintance with scientific principles is thus frequently tested. Some attend closely to the forms and curvatures of the piece of mechanism, to see whether the rules of geometry may aid them; some inquire whether the principles which govern the operation of the mechanical powers will avail for the solution; some study the effects of cohesion, of adhesion, of friction; others bear in their recollection the effects often produced by the pressure of air; while others, again—and perhaps the most numerous of all—look out keenly for the detection of some piece of trickery or legerdemain, whereby things have been made to appear what they are not.

These remarks may be illustrated by referring to the little piece of mechanism represented in our cut. It consists of a flat piece of wood, A, having a rectangular hole in the centre; and through this hole are inserted four other pieces, B B B B, moving freely in it, but still filling up the hole very exactly. Each one of these pieces has projecting knobs or blocks at both ends, so much thicker than the intermediate parts, as to extend far beyond the limits of the hole; and therefore the little rods are prevented from being drawn out. Now let it be stated at the outset, that the four rods are made of a different kind of wood to the flat piece which they perforate; that no glue or other cement is employed in the construction; nor any nails, pegs, or other modes of fastening; that in fact the mechanism consists of five solid and distinct pieces of wood, and let the question be put:—How were the little rods inserted in the hole? and How can they be withdrawn without fracture or injury? Any person to whom the apparatus was given would, in endeavouring to solve these questions, bring to the inquiry such knowledge as his reading or study might afford. He would perhaps consider whether the rods might be twisted round; or whether the plate through which they passed might be bent into a curve, and thus allow one of the projections to pass through; or whether, by separating the rods at one end, the projections at the other might be brought to more a favourable angle for emergence, &c.

Some years ago this mechanical puzzle attracted a good deal of attention. We do not know the inventor's name, but we believe the invention to have been German. A gentleman, writing to the editor of one of the public journals about twenty years back, in allusion to this piece of mechanism, thus speaks of the mode by which he solved the questions concerning it.

The sight of this puzzle has brought to my mind the amusement it afforded me, and a number of others, for a

short space out of eleven years' confinement in a French prison. Every crack and every corner of it was examined with the utmost nicety, but for some time without any clue to the mystery being discovered. It remained in this unsolved state about six months; when one of our party, although he was not permitted to act with it as Alexander did with the Gordian knot, thought there could be no harm in giving it a gentle squeeze. For want of a more convenient instrument, ingenuity was obliged to go work with it, as a careful boy who wishes to conserve his teeth would do with a walnut; it was jammed between the door, when, the knot being thus reduced to half its dimensions, the captive was let free. Having allowed the apparatus to remain afterwards a short time in water, it assumed its former appearance. By these means we found that the pieces could be placed and replaced at pleasure.

Here a principle, totally different from all those enumerated in a former paragraph, was tried; viz., the principle of *compression*. Wood being formed of fibrous material, interspersed with other portions of a soft, pithy character, is capable of being condensed into a smaller compass by pressure: while a subsequent immersion in water, by softening and loosening the compressed fibres, enables them to regain their former and natural condition. That this kind of compression is capable of being effected, has been proved even in the case of hard oak; for a six-inch plank of this tough material has been reduced by great pressure to a thickness of three inches; indeed at one time there was a proposition made to ship-builders to employ condensed wood of this kind, in some parts of ships. To effect the solution of our puzzle, however, it is necessary to employ some softer wood, such as fir, which will readily yield to pressure, and as readily regain its former dimensions.

A few years ago, a mechanical puzzle of this description made of mahogany rods passing through a hole in a piece of box-wood, was solved by pressing one of the projections in a vice till it was reduced to half its former thickness; the resumption of its original size, being afterwards effected by steeping the wood in warm water. It was at that time pointed out how this principle of compression might be practically applied with advantage. Hammers, choppers, and numerous other tools may have their wooden handles thus immovably fixed, by making the hole or mortice in the iron of a tapering form, compressing the end of the handle so as to cause it to pass through the small entrance, and then soaking the wood in water to re-expand it. The bars for chairs, and the planks for flooring boards, might be united in a firm manner by similar means. It is probably on this principle that we must explain a method sometimes adopted of splitting large masses of stone. For constructing mill-stones, a mass of stone is cut into the form of a cylinder, several feet in height. Circular and horizontal indentations are then cut in the surface, entirely around it, and at distances proper to produce the proper thicknesses for mill-stones. Wedges of willow, dried in an oven, are then driven into the indentations, by means of a mallet; and when they have been forced to a proper depth, they are moistened, or exposed to the humidity of the night air. On the following morning the pieces of stone are found to be severed one from another; or rather the solid block is rent into parallel circular pieces. Now in this case it seems probable that the forcible driving of the willow wedges compresses the wood of which they are formed; while the subsequent wetting restores them to their former thickness, and in so doing, rends the stone.

The principle of compression has also been most ingeniously applied in embossing wood. Raised figures upon wood, such as are employed in picture frames, and other articles of ornamental cabinet work, are usually produced by means of carving, or by casting the pattern in plaster of Paris, or other composition, and cementing, or otherwise fixing it on the surface of the wood. The former mode is expensive: the latter is on many occa-

sions inapplicable. Mr. Straker has invented a method which may be used either by itself, or in aid of carving.

The wood to be ornamented having been first worked out to its proposed shape, is in a state to receive the drawing of the pattern: this being put on, a blunt steel tool, or burnisher, or die, is to be applied successively to all those parts of the pattern intended to be in relief, and, at the same time, is to be driven very cautiously without breaking the grain of the wood, till the depth of the depression is equal to the intended prominence of the figures. The ground is then to be reduced by planing or filing to the level of the depressed part; after which the piece of wood being placed in water, either hot or cold, the part previously depressed will rise to its former height, and will then form an embossed pattern, which may be finished by the usual operations of carving.

For this invention, the Society of Arts voted to Mr. Straker, their silver Isis medal and ten guineas.

## MANUFACTURE OF WATCHES IN SWITZERLAND.

### I.

It is not, perhaps, generally known, that a large proportion of all the pocket watches used in Europe are made in a comparatively small district in the western part of Switzerland. Great as is the skill of the makers in France and England, yet from various causes the Swiss watches still maintain a sale to such a remarkable extent as to constitute an important item in the wealth of the country. The mountainous districts of Neuchatel, the western portion of the adjoining Canton of Berne, the Jura mountains, and the town of Geneva, are the principal seats of the manufacture. A brief notice of the rise and progress of the manufacture will be found interesting.

Up to the close of the seventeenth century, the inhabitants of Neuchatel had no idea of constructing clocks or watches with springs, having only made wooden clocks with weights. But about that time one of the inhabitants of the Neuchatel mountains, having returned home from a long voyage, brought with him a pocket-watch, the first seen by his neighbours. He gave it to a mechanic named Richard, for repair; and this Richard, who was an ingenious man, not only repaired the watch, but conceived the idea of constructing a similar article. After great labour and perseverance in the construction of all the different movements, and even of the tools wherewith he was to make them, he succeeded in making a watch. This achievement created a great sensation in the country, and excited the emulation of several ingenious men to imitate the example of their fellow-citizen; and by degrees the art of watch-making became introduced among the mountaineers, who had hitherto exercised no other trade or profession than those which are strictly necessary to their daily wants, their time being principally employed in cultivating an unproductive soil. They had been accustomed, before the introduction of this new branch of industry, to seek for work during the summer months among the people of the surrounding cantons, and to return to their families in winter, with the small amount of earnings which they had saved.

During the first forty or fifty years, a few workmen only were employed in watch-making, and, owing to the numerous difficulties they had to surmount, the slowness of execution caused by the want of convenient tools, and the absence of proper materials, the production and profits were inconsiderable. They began, at length, to procure the articles of which they stood in need; but the high prices which they had to pay for them induced many of the workmen to provide tools of home-manufacture. They ultimately succeeded not only in producing tools rivalling those of foreign manufacture, but in in-

roducing many new ones of a superior kind. From that period they have constantly been in the habit of inventing other instruments and tools, to facilitate and perfect the art of watch-making. In fact, the manufacture of watch-making tools has become almost as important a branch of trade as that of watches themselves; for tools are now forwarded to those countries which were formerly in the habit of supplying the mountaineers of Neuchatel with such articles. In proportion as a greater number of workmen embraced the profession of watch-making, several amongst them, animated by the wish of perfecting themselves in their art, went for that purpose to Paris, the great centre of arts and sciences. Those who came back to Switzerland greatly contributed by the knowledge they had acquired, to the development and advance of the art among their fellow-citizens. Others, such as Berthoud, Brequet, and Perrelet, settled permanently in Paris, and raised themselves to the highest degree of celebrity as horologists.

The effect which the introduction of this branch of art has produced on Neuchatel is most remarkable. About ninety years ago, a few merchants began to collect together small parcels of watches, in order to sell them in foreign markets. The success which attended these speculations encouraged the inhabitants to devote themselves still more sedulously to the production of such saleable articles, inasmuch that nearly the whole population of the Canton, with few exceptions, have embraced one or other of the various branches of this art. Meanwhile the population has increased three-fold, independently of the great number of workmen who are established in almost all the towns of Europe, in the United States of America, and even in the East Indies and China. The face of the country, too, has undergone great changes. Notwithstanding the natural barrenness of the soil, and the bleakness of the climate, the country is now studded with beautiful and well-built villages, connected by easy communications; while the population are in the enjoyment, if not of great fortunes, at least of a happy and easy independence. The upper valleys of Neuchatel form the nucleus or centre, from which the manufacture has spread east and west to the Cantons of Berne and Vaud, and the valleys of the Jura mountains.

The Neuchatel watch-makers, like artisans of other kinds, have occasionally had their arrangements somewhat disturbed by the introduction of machinery. A watch consists of a great many movements, or separate pieces, the making of which forms almost as many distinct branches of trade; but about the end of the last century a workman named Jeanneret invented some machines whereby many of these separate parts might be made much more rapidly than under the old method. The effects of this change were such as generally result from similar occurrences, viz., temporary distress, but ultimate benefit. The hand-workmen could not sustain the competition entailed upon them by the machine-made articles, and many of them experienced a great deal of misery and distress. Several were reduced to pauperism, and became a tax upon the public; while others were enabled to support themselves by embracing other branches of the trade. By degrees, however, this disarrangement ceased to be productive of distress, and the ultimate effect has been, that a very much larger number of watches are now made than when the whole were manufactured by hand, and the execution is much more accurate.

During the winter, which, in the mountainous districts, lasts six or seven months, the inhabitants remain almost wholly within doors, exercising their ingenuity and industry in watch-making; and nearly a hundred and twenty thousand watches are made annually in these elevated regions, of which about thirty-five thousand are of gold, and the rest of silver. Estimating the average value of the gold watches at a hundred and fifty francs each, (about six guineas English,) and of the silver



watches at twenty francs, (about seventeen shillings),\* it makes an aggregate of nearly seven millions of francs annually, (about two hundred and eighty thousand pounds), independent of the sale of clocks and of the instruments for watch-making, the proceeds for which are very large.

The continual intercourse which the inhabitants have been in the habit of maintaining with those countries where the mechanical arts have received the greatest developement, and the frequent voyages and travels of the merchants and manufacturers in those several countries, have had great influence upon the industry and ingenuity of the inhabitants. It is not by any protective laws that their prosperity has been brought about, for the makers have been from the first allowed to conduct their operations in the way most conducive to their own interests. As to the number of workmen employed, it is difficult to form a correct estimate, because the inhabitants are not congregated in large manufactories, but carry on their work in their own houses, and amidst their own families. It is supposed, however, that in the small canton of Neuchatel and its immediate vicinity, there are about twenty thousand persons employed in watch-making, or in manufacturing instruments and articles for the construction of watches. Each artisan working at home, and for whomsoever pays him the best price,—and the merchant having an interest to encourage by paying the best prices to those who furnish him with the best materials and work,—a kind of emulation is thus engendered among the workmen, to obtain preference and advantage. The workmen are mostly landed proprietors on a small scale: they cultivate their own ground in leisure hours, and live simply and frugally in the midst of their families.

Let us now turn to the town of Geneva, situated somewhat to the south of the canton which has lately occupied our attention. Although the introduction of the art of watch-making into Neuchatel was very singular and interesting, yet in point of time Geneva precedes it by centuries. In the ninth century, clocks were known in Geneva, and it is believed that the art of manufacturing them was imported from Germany. The bell, or sounding part of the machine, was added some time after; and in the eleventh century clocks were not uncommon. Chimes were a later invention, and, as the machinery by which time is measured became more complete and minute, watches became gradually introduced. In the year 1587, Charles Cusin, of Autun in Burgundy, settled in Geneva as a manufacturer of watches, which were at first sold for their weight in gold. He had many apprentices or pupils, and his success naturally attracted labour from less profitable employments, and spread the watch-making trade very rapidly. This trade may be divided into two branches, one of which relates to the making of chronometers, time-keepers, clocks, stop-watches, and all the varieties in which perfection of work is required. The second branch is that which relates more particularly to elegant watches, whose beauty of appearance is more valued than the excellence of the internal works.

For a long time Geneva stood alone; the maker found a ready sale at high prices, and reaped great wealth. By degrees, however, rivals sprang up to share some of her celebrity. Ingenious men from other parts came to Geneva to learn the art, and on being afterwards refused permission to settle there, they carried their skill and knowledge to other cantons and other countries. This rivalry, however, was a benefit rather than an injury to Geneva, for it gave a spirit of emulation to the watch-makers. The demand for watches kept increasing, and in time the ingenuity of individuals was excited to invent

machines, to improve the forms, and to display increased taste in the exterior embellishments.

The works or machinery of watches are made principally at Fontamelon and Beaucourt; and the unfinished work is sent to Geneva to be finished. The manufacture of repeating-watches led to another species of industry; for attention to the various tones elicited from metals, and the education of the people in the science of harmony, soon connected music with machinery. Musical seals, rings, watches, and boxes, were the result, and were produced in great numbers,—the first experiments having indeed been costly; but practice so reduced the price, as to create a large market, and still leave a considerable profit. The success of this new branch of manufacture encouraged other inventions: musical automata of various characters, some combining great perfection of motion with external beauty and perfect harmony, concentrated in an exceedingly small space.

In respect to the probable continuance of the Geneva watch-making trade, and the grounds on which it is partly based, Dr. Bowring (to whose valuable Reports we are chiefly indebted for these details) makes the following observations:—

A watch formerly had been an object indispensable for its use: it now became an article of taste and fashion; it furnished a convenient token for the expression of regard, and a present combining utility and taste with positive value. Under whatever form, and for whatever purpose employed, the use of watches became the cause of unbounded activity in the workshops of Geneva. Many fashionable watches, those of a more common description, and those of a still worse class, which sin against all true principles in their construction, those again remarkable from the singularity of their make, are, for the most part, an assemblage of parts destined to last but a little time, even for the first moment of their being put together, which time the watch-makers still further endeavour to shorten to the utmost of their power. The imperfections of these little machines are a certain warrant of their speedy destruction; besides which, the want of taste, the damage they receive in warehouses, through inattentive and unskilful hands, a salt or humid atmosphere, all sorts of accidents and want of care on the part of the owners, are further causes, which contribute powerfully to the destruction and demand for watches. If to the causes of destruction here mentioned, we add the vast new sources of demand arising out of increased civilization, the wider spread of general prosperity, the local industry which pervades every spot, the commerce which penetrates the most remote corners, we shall find in these circumstances abundant reason to anticipate a constantly increasing demand for the watches of Switzerland, which perpetually struggles to maintain its pre-eminence for taste and moderation in price. It may, therefore, be presumed that this branch of industry contains within it the seeds of a firm and permanent prosperity and is destined to increase rather than to decline.

There are several curious matters relating to the trade in watches between Switzerland and other countries; but we must defer a notice of these to another occasion.

He, who the public good intends,  
By bribes need never purchase friends:  
Who acts this just, this open part,  
Is prompt by every honest heart.—GAY.

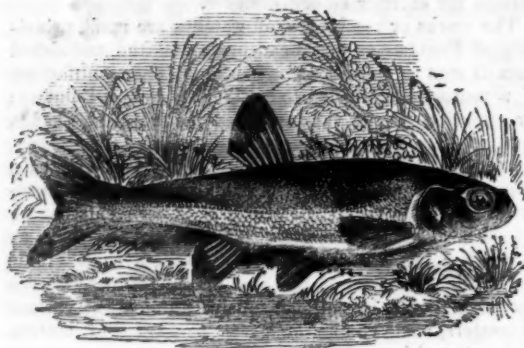
INFIDELITY is the beginning of sin, folly the foundation of infidelity, and the heart the seat of both.—BISHOP HORNE.

THE perfection of female character is a combination of private and public virtue,—of domestic charity, and zeal for the temporal and eternal happiness of the whole human race.—ELLIS.

It is infinitely presumptuous for a man to hope to inherit that estate to which he can show no title. The reasonableness of our hopes of Heaven depends upon the sure right and claim that we have to it; and prove this we cannot, but only by the obedience and purity of our lives, and their strict conformity to the excellent precepts of the Gospel.—DEAN SOUTH.

\* We must not judge of the value of a Swiss watch in Switzerland, by that of an English watch in England. In our own country the watches are made much more solid, durable, and mathematically correct, while, at the same time, the wages of labour are greatly higher than in Switzerland. These two circumstances account for the low averages mentioned above.

## FRESH-WATER FISH.

THE MINNOW, (*Cyprinus Phoxinus*.)

WE have described several species of the British *Cyprinidæ*, and we now come to one of the smallest, though not the least interesting. The minnow, or pink, abounds in most of our rivers, and generally in clear streams and rivulets throughout Europe. It is a prettily marked species, having very minute scales, and the lateral line straight and often gilded. Trout streams are generally well supplied with minnows, as both the trout and minnow delight in clear, cold, quick-running streams, with a stony or gravelly bottom. Minnows are delicately formed, and are active and amusing in their habits, but none of the species have been known to exist in confinement more than three years. They are gregarious, and swim in shoals. Their food consists of aquatic plants, worms, and animal matter. In the larger rivers minnows are only found in the little eddies of shallow water, where they can remain undisturbed by the violence of the current. But if the river becomes swollen by a heavy fall of rain, the minnow shoals are carried out from the shallows, and are almost at the mercy of the stream. Light and feeble as they are, they are ill able to contend with the current, and it is then that trout, pike, and other fishes fare sumptuously on this delicate food. Yet though minnows thus form no inconsiderable portion of the food of all the large fish that inhabit or visit the same waters, they still remain the most numerous of the whole, and it has been said that for every trout which is in the pools or currents of the best trout streams, there are probably ten thousand minnows in the shallows.

The minnow appears first in March, and continues until the end of September, when it retires to the mud or weeds to gain shelter from floods and from fishes of prey. Minnows deposit their spawn among gravel, in shallow water, where it is freely exposed to the sun's rays. When the young minnows first come out of the egg, they are exceedingly minute, and so transparent that hardly any part of them is visible, except the eyes, which are large and dark-coloured. In this state they are exposed to numerous enemies, for not only do they afford food to the more advanced fry of those fishes which spawn early, but they likewise contribute to the subsistence of the larvæ of many insects which pass that stage of their existence in the water.

Considered with reference to their size minnows are voracious eaters. Though they are incapable of swallowing a live fish of any considerable size, they nibble away at a dead one. Mr. Yarrell mentions having observed from a foot-bridge something at the bottom of the water which had the appearance of a flower. Observing it attentively he found that it consisted of a circular assemblage of minnows; their heads all met in a centre, and their tails diverging at equal distances, and being elevated above their heads, gave them the appearance of a flower half-blown. One was longer than the rest, and as often as a straggler came in sight he quitted his place to pursue him, and having driven him away he returned to it

again, no other minnow offering to take it in his absence. The object which attracted them all was a dead minnow, which they seemed to be devouring.

Minnows are so little alarmed or disturbed at the presence of man, that great facilities are afforded for watching their habits. Boys sometimes amuse themselves by making what they call "minnow tulips," which are nothing more than such assemblages of these fishes as are described above. A crumb of bread or piece of worm, is dropped into the water, usually tied to a pebble with a bit of thread, in order that it may sink the more rapidly, and be the less easily removed. The minnows which are playing about in the water, crowd towards the descending substance, and when it reaches the bottom there are generally as many heads in contact with it as can be wedged round, the axes of the fishes being inclined upwards towards the tails, and thus the whole bearing some resemblance to the petals of a flower, though certainly not much like a tulip.

The minnow is too diminutive to be much employed as food, and yet the flavour of this fish is equal to that of some of the most famed species. There are few places in which they are used in any other way than as a bait for other fishes, or for a boy's first attempt in angling; but when taken in sufficient quantity by means of a small meshed casting-net, they are sometimes cooked, and are accounted delicious. Isaac Walton says that in Spring excellent minnow-tansies may be made of them; by washing them well in salt, cutting off the heads and tails, and cleansing them, and then frying them with "yolks of eggs, the flowers of cowslips and primroses, and a little tansy." He assures us that when thus used they make "a dainty dish of meat." Walton's recipe is not likely to be used much in the present day, but minnows may be cooked in the same manner as whitebait, or they may be simply fried in butter.

The minnow varies in appearance at different seasons, but may be described in general terms thus. The upper part of the body is of a dusky olive-colour, a little mottled, and gradually passing into a lighter tint on the sides. This passes off into a tint of delicate pink, (giving a common name to the fish,) but this tint is only observable during summer. The irides and gill-covers are silvery-white, and the fins brown; those on the underside of the body paler than the others. The body is long and slender; the head about one-fifth of the length, exclusive of the caudal fin. The tail is large for the size of the fish, and very much forked. The dorsal and anal fins are also pretty large. The whole length of the fish seldom exceeds three inches.

As the ample Moon,  
In the deep stillness of a summer even  
Rising behind a thick and lofty grove,  
Burns like an unconsuming fire of light  
In the green trees, and kindling on all sides  
Their leafy umbrage, turns the dusky veil  
Into a substance glorious as her own,  
Yea, with her own incorporated, by power  
Capacious and serene:—Like power abides  
In man's celestial spirit; Virtue thus  
Sets forth and magnifies herself; thus feeds  
A calm, a beautiful and silent fire,  
From the incumbrances of mortal life,  
From error, disappointment,—nay, from guilt:  
And sometimes, so relenting Justice wills,  
From palpable oppressions of Despair.

WORDSWORTH.

THERE is scarcely any object in art or nature, calculated to excite our admiration, which may not, from being ill-placed, excite our ridicule or disgust.—ELLIS.

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